

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mechanical Engineering - Rocket Propulsion

Subject Co-ordinator - Prof. K. Ramamurthi

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction  
Lecture 2 - Motion in Space  
Lecture 3 - Rotational Frame of Reference and Orbital Velocities  
Lecture 4 - Velocity Requirements  
Lecture 5 - Theory of Rocket Propulsion  
Lecture 6 - Rocket Equation and Staging of Rockets  
Lecture 7 - Review of Rocket Principles; Propulsion Efficiency  
Lecture 8 - Examples Illustrating Theory of Rocket Propulsion and Introduction to Nozzles  
Lecture 9 - Theory of Nozzles  
Lecture 10 - Nozzle Shape  
Lecture 11 - Area Ratio of Nozzles; Under-expansion and Over-expansion  
Lecture 12 - Characteristic Velocity and Thrust Coefficient  
Lecture 13 - Divergence Loss in Conical Nozzles and the Bell Nozzle  
Lecture 14 - Unconventional Nozzles and Problems in Nozzles  
Lecture 15 - Criterion for Choice of Chemical Propellants  
Lecture 16 - Choice of Fuel-Rich Propellants  
Lecture 17 - Performance Prediction Analysis  
Lecture 18 - Dissociation of Products of Combustion  
Lecture 19 - Shifting Equilibrium and Frozen Flow in Nozzles  
Lecture 20 - Factors Influencing Choice of Chemical Propellants  
Lecture 21 - Low Energy Liquid Propellants and Hybrid Propellants  
Lecture 22 - Introduction to Solid Propellant Rockets  
Lecture 23 - Burn Rate of Solid Propellants and Equilibrium Pressure in Solid Propellant Rockets  
Lecture 24 - Design Aspects of Solid Propellant Rockets  
Lecture 25 - Burning Surface Area of Solid Propellant Grains  
Lecture 26 - Ignition of Solid Propellant Rockets  
Lecture 27 - Review of Solid Propellant Rockets  
Lecture 28 - Feed Systems for Liquid Propellant Rockets  
Lecture 29 - Feed System Cycles for Pump Fed Liquid Propellant Rockets

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- Lecture 30 - Analysis of Gas Generator and Staged Combustion Cycles and Introduction to Injectors
- Lecture 31 - Injectors, Cooling of Chamber and Mixture Ratio Distribution
- Lecture 32 - Efficiencies due to Mixture Ratio Distribution and Incomplete Vaporization
- Lecture 33 - Pumps and Turbines; Propellant Feed System at Zero  $\alpha$   $\gamma$  • Conditions
- Lecture 34 - Review of Liquid Bi-propellant Rockets and Introduction to Mono-propellant Rockets
- Lecture 35 - Introduction to Hybrid Rockets and a Simple Illustration of Combustion Instability in Liquid Prop
- Lecture 36 - Combustion Instability in Solid Propellant and Liquid Propellant Rockets  $\alpha$  Bulk and Wave Modes
- Lecture 37 - Wave modes of Oscillation
- Lecture 38 - Mechanisms Causing Instabilities and Strategies for Avoiding Combustion Instability
- Lecture 39 - Electric and Magnetic Fields and the Electrostatic Thruster
- Lecture 40 - Electrical Thrusters
- Lecture 41 - Advances in Rocket Propulsion